

**Operating Instructions
for
Viscosity Compensated
Flow Meter / Monitor**

Model: VKM



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

Diagram 8, Pipe, Group 1 dangerous fluids

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Viscosity Compensated Flow Meter / Monitor model: VKM
- Operating Instructions

4. Regulation Use

The models VKM are used for measuring and monitoring of viscous liquid flows (max. 540 mm²/s). They are suitable for measuring clean and homogeneous fluids which are compatible with the instrument materials used.

If using higher viscosity media, large deviations will occur to the measured values.

Large dirt particles may impede the movement of the float and cause false alarm conditions.

Ferritic particles deposited on the float (with magnet) may lead to the same effects.

The instruments are provided as follows:

Flow measurement (for Model VKM-6.. and VKM-7..)

The actual flow rate may be read directly off the magnetically operated pointer indicator mounted on the instrument. The scale indicates the flow rate directly in gallons or litres per minute.

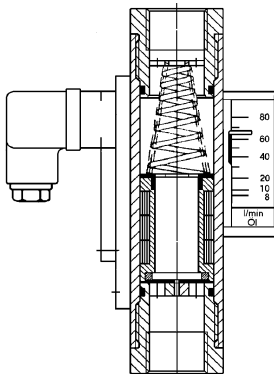
Limit Value Switches (for Model VKM-5.. and VKM-7..)

The instrument is fitted with one or two adjustable limit value switches for the monitoring of flow throughput values.

Type of contacts:

- N/O (cCSAus)
- Changeover (cCSAus)

5. Operating Principle



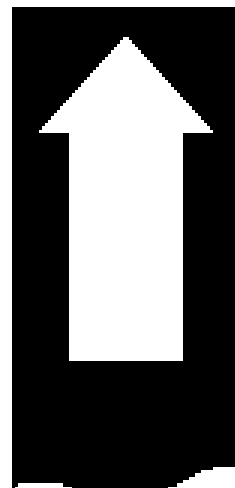
A hollow float with a sharp-edged orifice is located within a cylindrical bored metal housing. The flowing medium raises the float against the spring force. The position of the float corresponds to a particular flow rate which may be read from the needle indicator mounted on the instrument. Permanent magnets are fitted around the float which operate reed contact switches external to the flowing medium chamber.

The operation of the contacts is voltage free and works by means of magnetic force. i.e.: the contact is hermetically sealed from the flowing medium.

6. Mechanical Connection

Before installation:

- It should be confirmed that the maximum allowed operating pressures and operating temperatures of the equipment are not exceeded.
- (see table: standard material combinations).
- The instruments may be mounted in any flow direction. No recalibration is required when changing position. The flow must always take place in the direction of the arrow (see label).
- Remove all transport packing and ascertain that no packing material is left in the instrument.
- Sealing of the connection threads should be carried out with Teflon tape or similar.
- The instruments must not be installed within an induction field.
- if possible, after the mechanical installation, it should be checked that the connection thread to pipe is fully sealed (see section 8 Commissioning).

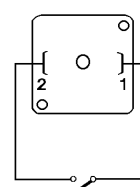


7. Electrical Connection

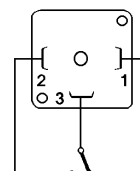
7.1. Switching Output VKM-5.. and VKM-7..

- Make sure that the supply wires are de-energized.
- Loosen the holding screw of the plug and pull out the cap from the socket.
- Make connection inside the plug-cap according to the wiring diagram.
- If the contact switchpoint has not been adjusted yet, it would be appropriate to do so at this point.
- (see section 8 Commissioning).
- Push the plug onto the socket, secure by using the locking screw. (see section 8 Commissioning).

N/O contact



Changeover contact



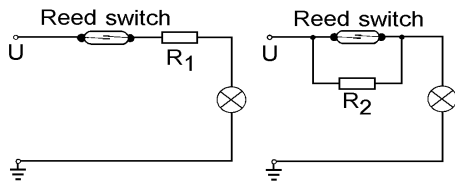
Attention! The given electrical specifications of reed switches must never be exceeded, even for a short time. For higher switching capacities we recommend the use of contact protection relays (e.g. or model MSR) or any other contact protection device.

After your designated external units are connected to the limit contact and adjustment of desired switching points is accomplished, then all the work regarding connections is completed.

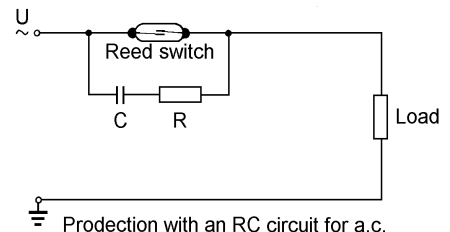
The unit can now be placed in operation.

7.2. Example for Contact Protective Measures

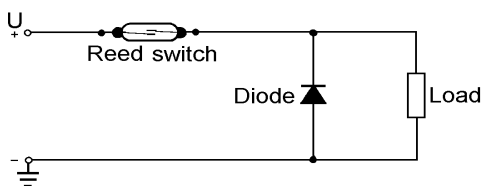
For capacitive and inductive loads (long cables and relay/protection) we recommend the following protective schemes.



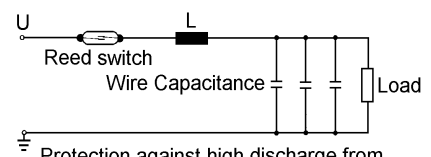
Lamp load with parallel or series resistance to the switch.



Protection with an RC circuit for a.c. current and inductive load.



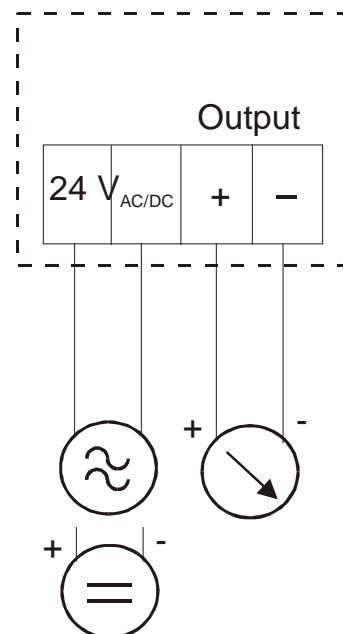
Protection with an idle diode for d.c. current and inductive load.



Protection against high discharge from condensers and loadcapacitances.

7.3. Analog Output VKM-0..

Connect the Flow Meter according to the wiring diagrams. The maximum load of the analog output is 500 Ω .



7.4. ADI-Evaluation Electronics VKM-6...K

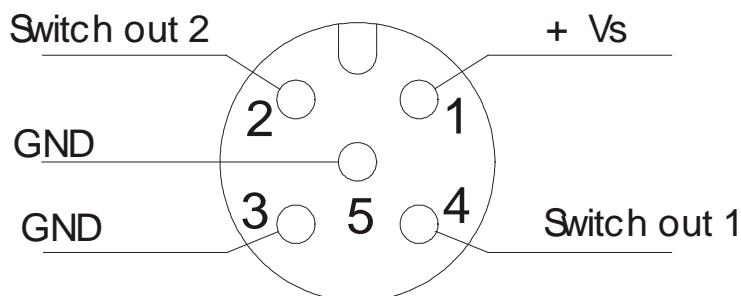
For connection of the power supply and the output signals please check with the operating instructions of the corresponding ADI electronic.



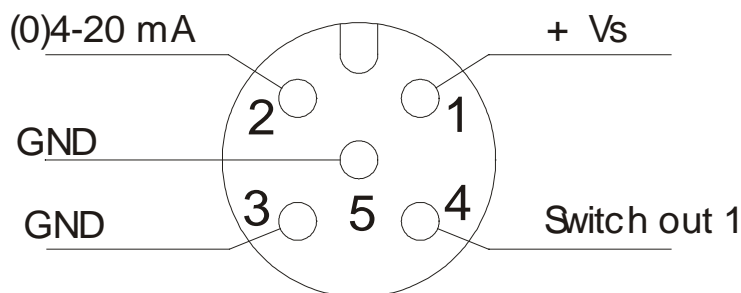
Information! The measuring input of the ADI is factory-set and cannot be changed in the field.

7.5. Compact electronic VKM-6...C3xx

Compact Electronic: (..C30R, ..C30M)



Compact Electronic: (..C34P, .. C34N)



8. Commissioning

8.1. General

Over-ranging

The flow range may be exceeded by a large margin with a non-pulsating flow. Only a certain increase in pressure loss is experienced. (The permissible maximum operating pressure must never be exceeded!).

Viscosity range

The instrument scale is suitable for a viscosity range of 1 - 540 mm²/s. Within this range, there is no need for recalibration.

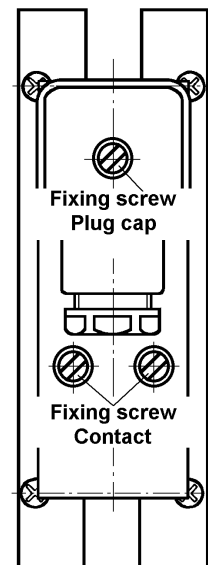
8.2. Switching Output VKM-5.. and VKM-7..

Hysteresis (VKM-5.. and VKM-7..)

Hysteresis is characterised by the difference between the switching on and switching off points of the contact. By matching the magnet and reed contact strength (AW Number) a hysteresis of approx. 3.5 mm of float movement is achieved. At the same time, it may be assured that the contacts have a Bistable switching characteristic.

Adjustment of the limit values (VKM-5..)

- Loosen the mounting screws on the contact.
- Position the marking on the contact in line with the required value on the housing scale.
- Tighten the mounting screws at this position.



Adjustment of the limit values (VKM-7..)

- With a screwdriver, loosen both mounting screws at the contact.
- Move the switch housing to the lowest position.
- After loosening the screws, remove the plug cap from the contact.
- Connect a suitable multimeter to PIN 1 & 2 (SPDT: contact PIN 2 & 3); (see page 5).
- When the instrument is already installed, open the inlet pipe and slowly allow the medium to flow until the pointer indicator shows the required minimum flow throughput. The reed switch is then closed (electrical continuity).
- Move the switch housing upwards until the reed switch just opens (no electrical continuity).
- At this position tighten the mounting screws. Replace the plug cap. The instrument is now ready for operation.
- By correct adjustment of the limit switch, a bi-stable switch condition is achieved, i.e.: even when exceeding the adjusted limit value, the contact remains closed (PIN 1 + 2 or PIN 2 + 3 for changeover contact option).

8.3. ADI-Evaluation Electronics VKM-6...K

For adjusting the output parameters (analog-, switching output) please check with the operating instruction of the corresponding ADI-electronic. The electronic of the ADI is already factory-set to the sensor.

8.4. Compact Electronic VKM-6...C3xx

See operating instructions supplement for Compact Electronics without frequency output.

9. Technical Information

Body:	VKM-x1...: Brass, nickel-plated VKM-x2...: Stainless steel 1.4301
Screwed fitting:	VKM-x1...: Brass, nickel-plated VKM-x2...: Stainless steel 1.4310
Float:	VKM-x1...: Brass, nickel-plated VKM-x2...: Stainless steel 1.4310
Orifice:	Stainless steel 1. 4310
Spring:	Stainless steel 1. 4310
Magnet:	Oxide ceramics
Seals:	VKM-x1...: NBR VKM-x2...: FPM
Max. Temperature:	+100 °C
Max. Pressure:	VKM-x1...: 250 bar VKM-x2...: 350 bar
Installation position:	Arbitrary
Basic accuracy:	±4% f. s. (with a viscosity of 105 mm ² /s)
Measuring error due to changes in viscosity:	For changes in viscosity within 1–540 mm ² /s the additional deviation is ± 5% f. s. maximum
Viscosity range:	1–540 mm ² /s
Contacts: Optional with VKM-5..., VKM-7...	
Electrical connection:	Connector DIN 43 650
Electrical switching values:	N/O contact and changeover contact (cCSAus) max. 230 V _{DC} / 0,26 A / 60 W, 60 V _{DC} / 1 A / 60 W, max. 240 V _{AC} / 0,42 A / 100 W, 100 V _{AC} / 1 A / 100 W
Protection:	IP 65 (electrical contact) IP 54 (side display)

VKM-0..

Analog output: 0-20 mA, 4-20 mA or 0-10 V
3-wire version, non-linear with flow
Auxiliary power: 24 V_{AC} or 24 V_{DC}
Max. Temperature: +80 °C
Max. Load: 500 Ω

VKM-6...K

Evaluating electronics: Digital indication, bargraph indication or
combined indication (digital/bargraph)

For technical information, please see separate the operating instructions for ADI

VKM-6...C3xx

Display: 3-digit LED display
Indication: semiconductor PNP or NPN
Analog output : 4–20 mA, 3-wire version
max. 500 Ω, linear
Auxiliary power: 24 V_{DC} +-20%
Max. Temperature: +80° C
Electrical connection: plug M12x1

For technical information, please see separate the operating instructions for
Compact Electronics

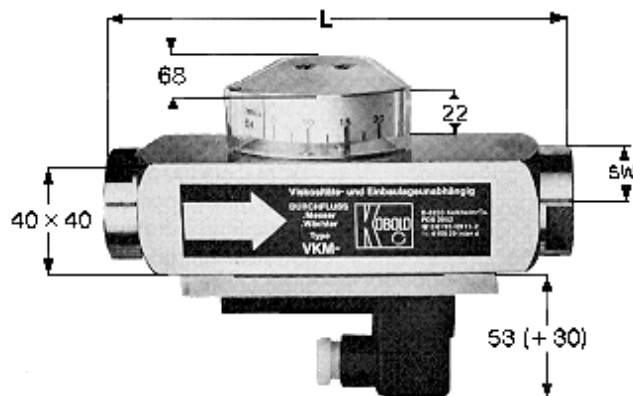


Attention! The maximum upper range values for the VKM-0..., VKM-6...C3xx and VKM-6...K are approximately 10% lower than for other VKM types.

10. Maintenance

In cases where the medium to be measured is uncontaminated, the models VKM are almost maintenance-free. However, where calcium or dirt deposits form in the housing or other internal parts, the instruments should be regularly cleaned. With a suitable open-ended spanner, remove the instrument from the pipe. After removal of the uppermost threaded connection, the internal parts may be removed for cleaning. The internal parts can be cleaned with a suitable brush. After cleaning, reassemble the instrument in the correct order of assembly. Please note that the spring must be installed into the nipple of the upper threaded connection and onto the float body. The lower end of the float with the inserted orifice is located at the fluid inlet side.

11. Dimensions

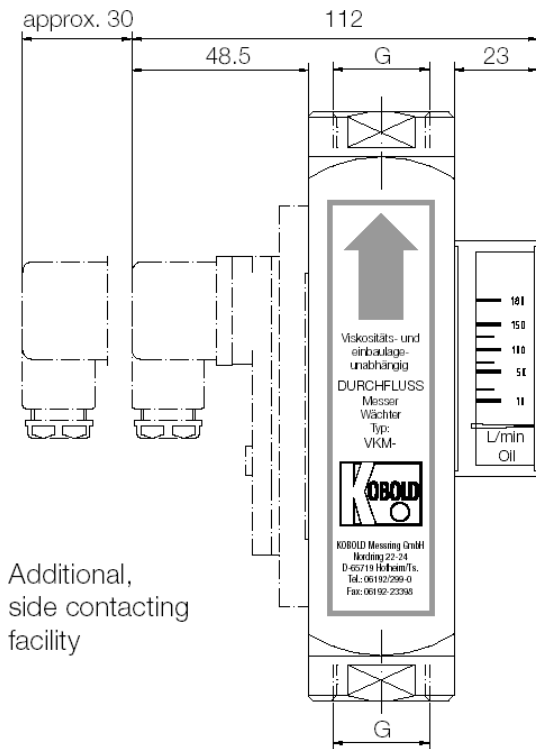


Model	Square (mm)	Length (mm) Connection	SW (mm) Connection	Weight* (Lb.)
VKM-..01	40x40	162	36	3.8
VKM-..02	40x40	162	36	3.8
VKM-..03	40x40	162	36	3.8
VKM-..04	40x40	162	36	3.8
VKM-..05	40x40	162	36	3.8
VKM-..06	40x40	162	36	3.8
VKM-..07	40x40	162	36	3.5
VKM-..08	40x40	162	36	3.5
VKM-..09	40x40	162 (186,5)**	36 (41)**	3.8
VKM-..10	40x40	162 (186,5)**	36 (41)**	3.8
VKM-..11	40x40	162 (186,5)**	36 (41)**	3.8
VKM-..12	40x40	186,5	41	3.8

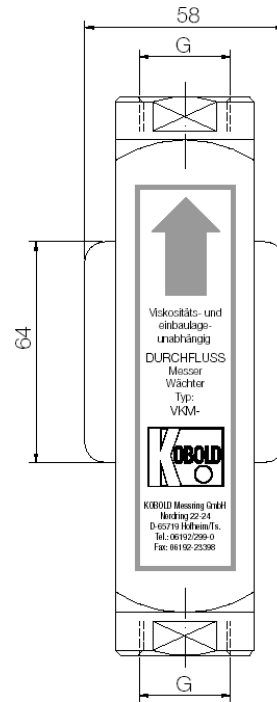
* Weight valid for: VKM-5..., VKM-6...
 for model VKM-7... + 0.25 lb.
 for model VKM-0... + 0.5 lb.
 for model VKM-6...K & C3xx.. + 3.1 lb.

** at G1 or 1 NPT

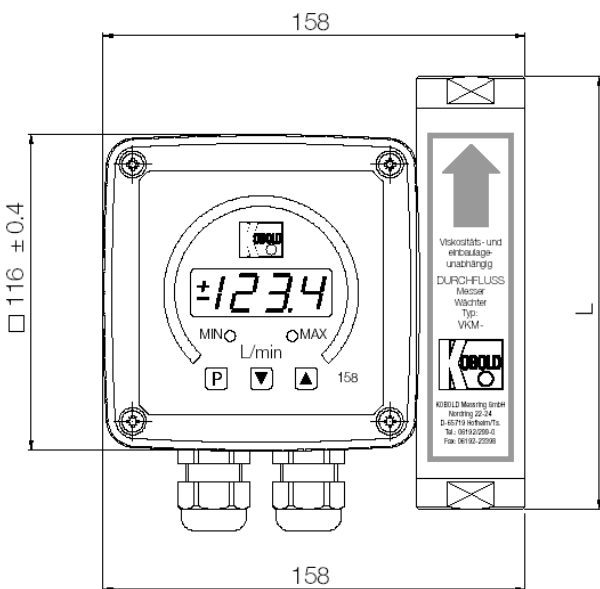
VKM-5..., VKM-6..., VKM-7..



VKM-0...



VKM-6...K



Depth 127 mm

VKM-6...C3xx

